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Structure of rotational spectra of vectorial wave fields in the middle atmosphere

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Abstract

In this work the time spectra dynamics of zonal and meridional average daily values of wind velocity was investigated. An analysis is carried out using Atmospheric Assimilated Data acquired from British Atmosphere Data Center United Kingdom Met Office on the height range 0-55 km in the grid node correspondent to Kazan and experimental data of the wind velocity acquired by radio meteor measurements in radio meteor station of Kazan State University (56N, 49E) for height range 80-100 km. The seasonal structure of zonal circulation and planetary wave activity is established in the height range of the troposphere, the stratosphere, the mesosphere and the lower thermosphere using wavelet transformation and rotational spectra. An intensity of planetary waves has a stable maximum in the winter on heights above 20 km. The stable maximum of the intensity of planetary waves is observed in the height of the tropopause during the whole year. A regime of planetary waves with specific rotation of resulting wind velocity vector (clockwise and anticlockwise) appears on heights of the lower and middle atmosphere with the prevailing of a certain type of rotation depending on height, season and scale of planetary waves.

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Keywords

Circulation, Planetary waves, Rotational spectra, Wavelet analysis